Electronic Version
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Claims

[c1] 1. An electrical contact system for transmitting information across tool joints in a drill string and configured to minimize signal reflections occurring at the tool joints, the electrical contact system comprising:
a first electrical contact comprising:
a first annular resilient material; and
a first annular conductor embedded within the first annular resilient material, the first annular conductor having a surface exposed from the first annular resilient material;
a second electrical contact adapted to engage the first electrical contact, the second electrical contact having a second annular resilient material and a second annular conductor;
the first electrical contact configured to contact the second electrical contact such that the first and second annular conductors come into physical contact; and
the first and second resilient materials being further characterized by dielectric characteristics and dimensions adjusted to provide a desired impedance to the first and second electrical contacts.

[c2] 2. The electrical contact system of claim 1, wherein the first and second electrical contacts further comprise first and second annular housings, respectively, to accommodate the first and second annular resilient materials, and the first and second annular conductors, respectively.

[c3] 3. The electrical contact system of claim 2, further comprising at least one biasing member to urge the first electrical contact against the second electrical contact.

[c4] 4. The electrical contact system of claim 3, wherein the biasing member is selected from the group consisting of a spring, an elastomeric material, an elastomeric-like material, a sponge, and a sponge-like material.

[c5] 5. The electrical contact system of claim 2, wherein at least one of the first and second annular housings are sprung with respect to a mating surface of a downhole tool, thereby providing a biasing effect to at least one of the first and second electrical contacts.

[c6] 6. The electrical contact system of claim 2, wherein the first and second electrical contacts are further configured to be pressed together by pressure encountered in a downhole environment.

[c7] 7. The electrical contact system of claim 2, wherein at least one of the first and second electrical contacts is

configured to orbit with respect to a mating surface of a downhole tool.

[c8] 8. The electrical contact system of claim 1, wherein the resilient is selected such that it flows into voids present in the first and second electrical contacts.

[c9] 9. The electrical contact system of claim 1, wherein the first and second resilient materials comprise at least one material selected from the group consisting of silicone, Vamac, polysulfide, Neoprene, Hypalon, butyl, Teflon, millable polyurethane, cast polyurethane, rubber, fluorosilicone, epichlorohydrin, nitrile, styrene butadiene, Kalrez, fluorocarbon, Chemraz, and Aflas.

[c10] 10. The electrical contact system of claim 9, wherein the first and second resilient materials further comprise at least one modifier to strengthen the resilient material.

[c11] 11. The electrical contact system of claim 1, wherein a cable is electrically connected to at least one of the first and second electrical contracts, and wherein the impedance of the at least one electrical contact is adjusted to match the impedance of the cable.

[c12] 12. The electrical contact system of claim 11, wherein the cable is a coaxial cable.

[c13] 13. The electrical contact system of claim 1, further comprising a third annular conductor embedded in the first annular resilient material, the third annular conductor being exposed therefrom.

[c14] 14. An electrical contact system for transmitting information across tool joints in a drill string, the electrical contact system comprising:
a first electrical contact comprising:
a first annular resilient material;
a first annular conductor embedded within the first annular resilient material, the first annular conductor having a surface exposed from the first annular resilient material; and
a first annular housing forming an open channel accommodating the first annular resilient material and the first annular conductor;
a second electrical contact adapted to engage the first electrical contact, the second electrical contact having a second annular resilient material, a second annular conductor, and a second annular housing;
the first electrical contact configured to contact the second electrical contact such that the first and second annular conductors come into physical contact; and
the first and second resilient materials further providing a biasing effect keeping the first and second annular

conductors pressed together.

[c15] 15. The electrical contact system of claim 14, further comprising at least one biasing member to urge the first electrical contact against the second electrical contact.

[c16] 16. The electrical contact system of claim 14, wherein at least one of the first and second annular housings are sprung with respect to a mating surface of a downhole tool, thereby providing a biasing effect to at least one of the first and second electrical contacts.

[c17] 17. The electrical contact system of claim 14, wherein the first and second electrical contacts are further configured to be pressed together by pressure encountered in a downhole environment.

[c18] 18. The electrical contact system of claim 14, wherein at least one of the first and second electrical contacts is configured to orbit with respect to a mating surface of a downhole tool.

[c19] 19. The electrical contact system of claim 14, wherein the resilient is selected such that it flows into voids within the first and second electrical contacts.

[c20] 20. The electrical contact system of claim 14, wherein a cable is electrically connected to at least one of the first

and second electrical contracts, and wherein the impedance of the at least one electrical contact is adjusted to match the impedance of the cable.

[c21] 21. A method for transmitting information across tool joints in a drill string while minimizing signal reflections occurring at the tool joints, the method comprising:
providing a first electrical contact comprising:
a first annular resilient material; and
a first annular conductor embedded within the first annular resilient material, the first annular conductor having a surface exposed from the first annular resilient material;
providing a second electrical contact adapted to engage the first electrical contact, the second electrical contact having a second annular resilient material and a second annular conductor;
adjusting at least one of the dielectric characteristics and the dimensions of the first and second resilient materials to provide a desired impedance to the first and second electrical contacts.

[c22] 22. The method of claim 21, further comprising providing first and second annular housings to the first and second electrical contacts, respectively, to accommodate the first and second annular resilient materials, and the first and second annular conductors, respectively.

[c23] 23. The method of claim 22, further comprising urging the first electrical contact against the second electrical contact.

[c24] 24. The method of claim 21, wherein adjusting further comprises adjusting the impedance to match the impedance of a cable electrically connected to at least one of the first and second electrical contracts.

[c25] 25. The method of claim 24, wherein the cable is a coaxial cable.